CLAIMS

We Claim:

1. A method of communicating data streams, the method comprising:
   a. packetizing one or more data streams into isochronous data packets;
   b. encapsulating one or more isochronous data packets according to a real-time transport protocol to form a real-time transport protocol data packet; and
   c. sending the real-time transport protocol data packets from a transmitting device to a receiving device over a non-isochronous compliant network.

2. The method of claim 1 wherein the transmitting device is coupled to a first isochronous compliant network and the receiving device is coupled to a second isochronous compliant network.

3. The method of claim 2 wherein the first isochronous compliant network and the second isochronous compliant network each comprise an IEEE 1394 compliant bus architecture.

4. The method of claim 3 wherein the first isochronous compliant network and the second isochronous compliant network are coupled via the non-isochronous compliant network.

5. The method of claim 4 wherein the non-isochronous compliant network comprises an Internet Protocol network.

6. The method of claim 5 wherein the Internet Protocol network comprises an Ethernet/Internet Protocol network.

7. The method of claim 2 further comprising generating a cycle record for each isochronous cycle of the first isochronous compliant network, wherein each cycle record includes a relative timing marker that indicates a timing of the real-time transport protocol data packet relative to the cycle master of the first isochronous compliant network.

8. The method of claim 1 wherein the real-time transport protocol defines a real-time transport protocol header and a real-time transport protocol data payload for each real-time transport protocol data packet.

9. The method of claim 8 wherein the real-time transport protocol data payload comprises one or more isochronous cycle records.

10. The method of claim 9 wherein each of the one or more isochronous cycle records comprises zero or more isochronous data packets.

11. The method of claim 10 wherein each isochronous data packet comprises an IEEE 1394 isochronous data packet.

12. The method of claim 11 wherein each IEEE 1394 isochronous data packet includes an IEEE 1394 data payload formatted according to an IEC 61883-1 compliant Common Isochronous Protocol (CIP).

13. The method of claim 8 wherein the real-time transport protocol header includes a timestamp, the timestamp is defined by a value of the isochronous cycle start transaction corresponding to the receipt of a first isochronous data packet included in a particular real-time transport protocol data packet.

14. The method of claim 1 wherein each real-time transport protocol data packet includes at least a portion of an isochronous cycle record.

15. An apparatus for communicating data streams, the apparatus comprising:

a. means for packetizing one or more data streams into isochronous data packets;

b. means for encapsulating one or more isochronous data packets according to a real-time transport protocol to form a real-time transport protocol data packet; and

c. means for sending the real-time transport protocol data packets from a transmitting device to a receiving device over a non-isochronous compliant network.

16. The apparatus of claim 15 wherein the transmitting device is coupled to a first isochronous compliant network and the receiving device is coupled to a second isochronous compliant network.

17. The apparatus of claim 16 wherein the first isochronous compliant network and the second isochronous compliant network each comprise an IEEE 1394 compliant bus architecture.

18. The apparatus of claim 17 wherein the first isochronous compliant network and the second isochronous compliant network are coupled via the non-isochronous compliant network.

19. The apparatus of claim 18 wherein the non-isochronous compliant network comprises an Internet Protocol network.

20. The apparatus of claim 19 wherein the Internet Protocol network comprises an Ethernet/Internet Protocol network.

21. The apparatus of claim 16 further comprising means for generating a cycle record for each isochronous cycle of the first isochronous compliant network, wherein each cycle record includes a relative timing marker that indicates a timing of the real-time transport protocol data packet relative to the cycle master of the first isochronous compliant network.

22. The apparatus of claim 15 wherein the real-time transport protocol defines a real-time transport protocol header and a real-time transport protocol data payload for each real-time transport protocol data packet.

23. The apparatus of claim 23 wherein the real-time transport protocol data payload comprises one or more isochronous cycle records.

24. The apparatus of claim 23 wherein each of the one or more isochronous cycle records comprises zero or more isochronous data packets.

25. The apparatus of claim 24 wherein each isochronous data packet comprises an IEEE 1394 isochronous data packet.

26. The apparatus of claim 25 wherein each IEEE 1394 isochronous data packet includes an IEEE 1394 data payload formatted according to an IEC 61883-1 compliant Common Isochronous Protocol (CIP).

27. The apparatus of claim 22 wherein the real-time transport protocol header includes a timestamp, the timestamp is defined by a value of the isochronous cycle start transaction corresponding to the receipt of a first isochronous data packet included in a particular real-time transport protocol data packet.

28. The apparatus of claim 22 wherein each real-time transport protocol data packet includes at least a portion of an isochronous cycle record.

29. An apparatus to communicate data streams, the apparatus comprising:

a. a transmitting circuit configured to encapsulate one or more first isochronous data packets according to a real-time transport protocol, thereby forming a first real-time transport protocol data packet, and to transmit the first real-time transport protocol data packets over a non-isochronous compliant network; and

b. a receiving circuit configured to receive a second real-time transport protocol data packet from the non-isochronous compliant network, and to de-encapsulate the received second real-time transport protocol data packets into one or more second isochronous data packets.

30. The apparatus of claim 29 wherein the transmitting circuit and the receiving circuit are each coupled to an isochronous compliant network.

31. The apparatus of claim 30 wherein the isochronous compliant network comprises an IEEE 1394 compliant bus architecture.

32. The apparatus of claim 29 wherein the real-time transport protocol defines a real-time transport protocol header and a real-time transport protocol data payload for each real-time transport protocol data packet.

33. The apparatus of claim 32 wherein the real-time transport protocol data payload comprises one or more isochronous cycle records.

34. The apparatus of claim 31 wherein each of the one or more isochronous cycle records comprises zero or more isochronous data packets.

35. The apparatus of claim 33 wherein each isochronous data packet comprises an IEEE 1394 isochronous data packet.

36. The apparatus of claim 35 wherein each IEEE 1394 isochronous data packet includes an IEEE 1394 data payload formatted according to an IEC 61883-1 compliant Common Isochronous Protocol (CIP).

37. The apparatus of claim 32 wherein the real-time transport protocol header includes a timestamp, the timestamp is defined by a value of the isochronous cycle start transaction corresponding to the receipt of a first isochronous data packet included in a particular real-time transport protocol data packet.

38. The apparatus of claim 29 wherein the transmitting circuit is further configured to packetize one or more data streams into the one or more isochronous data packets.

39. The apparatus of claim 29 wherein the transmitting circuit is further configured to receive the one or more isochronous data packets from another device.

40. The apparatus of claim 29 wherein the receiving circuit is further configured to parse the one or more isochronous data packets from each received real-time transport protocol data packet.

41. The apparatus of claim 40 wherein each received real-time transport protocol data packet includes at least a portion of an isochronous cycle record.

42. The apparatus of claim 41 wherein each isochronous cycle record comprises zero or more isochronous data packets.

43. A network of devices to communicate data streams, the network of devices comprising:

a. a transmitting device configured to encapsulate one or more isochronous data packets according to a real-time transport protocol, thereby forming a real-time transport protocol data packet, and to transmit the real-time transport protocol data packets;

b. a first isochronous compliant network coupled to the transmitting device;

c. a receiving device configured to receive the real-time transport protocol data packets;

d. a second isochronous compliant network coupled to the receiving device; and

e. a non-isochronous compliant network coupled to the first isochronous compliant network and the second isochronous compliant network to transmit the real-time transport protocol data packets from the transmitting device to the receiving device.

44. The network of devices of claim 43 wherein the first isochronous compliant network and the second isochronous compliant network each comprise an IEEE 1394 compliant bus architecture.

45. The network of devices of claim 43 wherein the non-isochronous compliant network comprises an Internet Protocol network.

46. The network of devices of claim 45 wherein the Internet Protocol network comprises an Ethernet/Internet Protocol network.

47. The network of devices of claim 43 wherein the real-time transport protocol defines a real-time transport protocol header and a real-time transport protocol data payload for each real-time transport protocol data packet.

48. The network of devices of claim 47 wherein the real-time transport protocol data payload comprises one or more isochronous cycle records.

49. The network of devices of claim 48 wherein each of the one or more isochronous cycle records comprises zero or more isochronous data packets.

50. The network of devices of claim 48 wherein each isochronous data packet comprises an IEEE 1394 isochronous data packet.

51. The network of devices of claim 50 wherein each IEEE 1394 isochronous data packet includes an IEEE 1394 data payload formatted according to an IEC 61883-1 compliant Common Isochronous Protocol (CIP).

52. The network of devices of claim 47 wherein the real-time transport protocol header includes a timestamp, the timestamp is defined by a value of the isochronous cycle start transaction corresponding to the receipt of a first isochronous data packet included in a particular real-time transport protocol data packet.

53. The network of devices of claim 43 wherein the transmitting device is further configured to packetize one or more data streams into the one or more isochronous data packets.

54. The network of devices of claim 43 wherein the transmitting device is further configured to receive the one or more isochronous data packets from another device.

55. The network of devices of claim 43 wherein the receiving device is further configured to parse the one or more isochronous data packets from each received real-time transport protocol data packet.

56. The network of devices of claim 55 wherein each received real-time transport protocol data packet includes at least a portion of an isochronous cycle record.

57. The network of devices of claim 56 wherein each isochronous cycle record comprises zero or more isochronous data packets.

58. A method of communicating data streams, the method comprising:

a. packetizing one or more data streams into IEEE 1394 compliant isochronous data packets;

b. encapsulating one or more IEEE 1394 compliant isochronous data packets according to a real-time transport protocol to form a real-time transport protocol data packet; and

c. sending the real-time transport protocol data packets from a transmitting device to a receiving device over a non-isochronous compliant network.

59. The method of claim 58 wherein the transmitting device is coupled to a first IEEE 1394 compliant bus architecture and the receiving device is coupled to a second IEEE 1394 compliant bus architecture.

60. The method of claim 59 wherein the non-isochronous compliant network comprises an Internet Protocol network.

61. The method of claim 60 wherein the Internet Protocol network comprises an Ethernet/Internet Protocol network.

62. The method of claim 59 further comprising generating a cycle record for each isochronous cycle of the first IEEE 1394 compliant bus architecture, wherein each cycle record includes a relative timing marker that indicates a timing of the real-time transport protocol data packet relative to the cycle master of the first IEEE 1394 compliant bus architecture.

63. The method of claim 58 wherein the real-time transport protocol defines a real-time transport protocol header and a real-time transport protocol data payload for each real-time transport protocol data packet.

64. The method of claim 63 wherein the real-time transport protocol data payload comprises one or more 1394 compliant isochronous cycle records.

65. The method of claim 64 wherein each of the one or more isochronous cycle records comprises zero or more isochronous data packets.

66. The method of claim 65 wherein each IEEE 1394 isochronous data packet includes an IEEE 1394 data payload formatted according to an IEC 61883-1 compliant Common Isochronous Protocol (CIP).

67. The method of claim 58 wherein the real-time transport protocol header includes a timestamp, the timestamp is defined by a value of the isochronous cycle start transaction corresponding to the receipt of a first 1394 compliant isochronous data packet included in a particular real-time transport protocol data packet.

68. The method of claim 58 further comprising parsing the one or more IEEE 1394 compliant isochronous data packets from each real-time transport protocol data packet received by the receiving device.

69. The method of claim 58 wherein each real-time transport protocol data packet includes at least a portion of an isochronous cycle record.